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The aims of the social studies curriculums include growth of the pupil in social competence and awareness. In order to permit the teacher knowledge as to what social studies materials best contribute to the development of those aims, this study evaluated the readability level of three second grade social studies textbooks. (1) "We Have Friends," (2) "You and the Neighborhood," and (3) "Learning About Our Neighbors." Two readability formulas (one developed by Spache; the other, by Yoakam) were used to obtain the readability levels. The first book was found to be on the second grade level, but the other two yielded higher grade levels of readability. The Yoakam formula rated the books higher than the Spache formula but not significantly so. Some variation in readability level was found to exist within a single book, the result being that some sections were readily comprehensible to the student while others were relatively more difficult. (WD)

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THE READABILITY OF SELECTED SECOND GRADE SOCIAL STUDIES TEXTBOOKS

BY

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THE READABILITY OF SELECTED SECOND GRADE SOCIAL STUDIES TEXTBOOKS

by

DeVonne Gae Turner

INTRODUCTION

It is axiomatic that the aims of the social studies curricula include growth in social competence and awareness. The task of the elementary school and its teacher is to develop programs which will make it possible for the child to achieve these ends.

In order to facilitate the development of these goals the classroom teacher must have at hand as much information and materials as possible. Included in these is the cumulative knowledge gained in all of the areas encompassed in the Social Sciences, as well as those found in others. While the relative merits of a single textbook, supplemented of course by other materials, might be debated, it is not the purpose of this study to do so.

The investigator recognizes that the basic realities of most elementary curricula preclude such debates as relatively fruitless. Therefore, as a basic textbook must be found which will, with the teacher's use and guidance, achieve the previously mentioned aims, the writer will attempt to examine current social studies textbooks now in

use.

Recognizing that the selection of basal reading materials for the social studies programs continues to present a number of difficult problems that need to be resolved in making intelligent decisions and choices, this study is undertaken to determine the readability of three selected social studies textbooks now in use in this area.

Statement of the Problem

The purpose of this study was to determine the readability level of three social studies textbooks now being used in the second grade. The titles of these books are:

1. We Have Friends, The L.W. Singer Company, 1963.
2. You and the Neighborhood, Benefic Press, 1965.
3. Learning About Our Neighbors, Allyn and Bacon Inc., 1964.

The Spache and Yoakam Formulas were used in determining the readability level.

Limitations of the Study

This study was conducted within the following limitations:

1. Data were collected from only three second grade social studies textbooks.
2. The validity of a reading formula.
3. Two reading formulas were used.
4. The formulas used had a limited technical and scientific vocabulary.

Definitions of Terms Used

Readability: Webster's Unabridged Dictionary defines readable as "legible, easy to read, because interesting or pleasing; that permits or admits of reading."[1]

According to Klare, there are three elements that make a book readable. They are the following:

1. To indicate legibility of either handwriting or typography.
2. To indicate ease of reading due to either the interest value of the pleasantness of writing.
3. To indicate ease of understanding or comprehension due to the style of writing.[2]

Readability Formula: Yoakam gives this definition: "... a device for measuring the readability level of textbooks and other materials in order to determine the amount of reading ability required to read the material successfully."[3]

Spache defines a readability formula as a "...statistical analysis of the structural traits present in a certain type of reading material."[4]

Klare states that a readability formula is "...a method of measurement intended as a predictive device that will provide quantitative, objective estimates of the style difficulty of writing."[5]

Social Studies: "This definition used was that given by Michaelis:

> The social studies... in the elementary school embrace material related to human relationships drawn from history, geography, political science, economics, anthropology, sociology, science, and the arts.[6]

Others: All other terms used were defined as stated in the World Book Encyclopedia Dictionary.[7]

Review of Literature

"Foremost among the thoughts of educators today is a concern for the effectiveness of an instructional program on the learner's concept and skill development."[8] Most would agree that curricula changes, instructional innovations, and recently developed teaching resources have contributed to improved pupil understandings. New procedures employed by the teachers of a social studies curriculum to help children develop concepts are diversified.

The recognition of the human growth principle of individual differences has for many years had a profound effect on educational theory and practice. In seeking to meet the varying needs of the many different personalities found in a classroom, educators have long sought to find materials suitable to the needs and abilities of the pupils. From these efforts have grown methods which seek to measure the difficulty of materials used in classroom situations and attempts to make these classroom materials more suitable.[9]

The types of activities in the social studies curriculum are determined in part by the content and skill objectives of the selected textbook. With so much of learning activities dependent on reading skills, one main field of research is measuring the extent of readability of the materials.

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History of readability formulas. People have probably been concerned with readability since symbols first were used and recorded. The first recorded attempt to examine readability specifically was made by Talmudists in 900 A. D. It used frequency of occurrence to distinguish usual from unusual meaning. Therefore, the first concern for readability was among religious writers as they were for the most part the only literate people of their day.

The next evidence of interest was in connection with children's reading among educators. McGuffey is credited for having given impetus to the careful grading of instructional materials. Since the publication of his graded series of readers, about 1840, interest in problems of readability has waxed. The road to a more nearly scientific appraisal and prediction has been paved by a long series of investigations and reports.

> The word count constructed in 1898 by F. W. Kaeding, a German, next provided a more scientific base for relating vocabulary to reading difficulty and establishing a basic vocabulary foundation. N. A. Rubakin, a Russian, compiled a list of 1500 familiar words in 1889, indicating something of the widespread interest in vocabulary list by this time.[10]

Little was done in the way of quantitive measurement until the early 1920's. The sudden surge of research at that time was made possible by the publication in 1921, of The Teacher's Word Book by E. L. Thorndike. His tabulations

of the frequency with which words occur in print not only influenced the teaching of vocabulary in the schools but also provided the basis for the work of Lively and Pressey in 1923 in developing the first method of measuring readability that can really be considered a formula.[11] Two similar word books were subsequently published by Thorndike and all three played an important role in the developmental history of formulas.[12]

During the years 1923 to 1959, thirty-one formulas and ten variations of existing formulas were found to have been published.[13] According to Klare there appear to have been four general periods of development during these years.

I. Early Formulas (1921-1934)
This period can be characterized by the following:
   a. Primary attention to vocabulary as a basis for predicting readability.
   b. Dependence upon Thorndike's, Teacher Word Book as the basis for measures of vocabulary difficulty.
   c. Use of relatively crude criteria for reading difficulty.

2. Detailed Formulas (1934-1938)
This period as a whole was characterized by the use of:
   a. More and different factors (compared to the preceding work).
   b. Less emphasis on Thorndike's word count.
   c. A generally increased concern for an adequate criterion.

3. Efficient Formulas (1938-1953)
This period the formulas seemed to emphasize efficiency and simplicity of use.

4. Specialized Formulas (1953-1959)

> This most recent period in the history of readability formulas was marked more by an interest in developing specialized formulas than by any other. There had been specialized formulas before, but the primary emphasis lay in something else-achieving maximum prediction with detailed formulas, or developing efficient formulas, or presenting general formulas of wide applicability. During the years from about 1953 on, either special aspects of readability such as level of abstraction or special audience level such as primary grade, were the object of prediction. It seems likely that the immediate future will continue to be characterized by specialized formulas for particular purposes.[14]

The various formulas and formula versions developed over the years are summarized in Table XI.* To make possible a concise presentation, only the following, in this order, are given: (1) name of author or authors; (2) date of publication; (3) approximate range of difficulty of the reading material used in the development of the formula; (4) the formula itself, as best it can be presented in a condensed fashion; and (5) a comment on the formula where something deserves special notice. The order of presentation is chronological, except that variations of existing formulas follow immediately the formulas they were based on, regardless of date of publication.[15]

In the past few years rapid developments in readability research have been reported by Bormuth.

> The readability formulas available only three years ago could, at best, predict only 25 to 50 percent of the variation we observe in the difficulties of instructional materials. Today, we have not one but several prototype formulas which are able to predict 85 to 95 percent of the variation. The high level of precision represents an improvement of from

---

*Note: See Appendix D

35 to 75 percent over the validities of older readability formulas.[16]

Need for readability formulas. Chall reported that three factors gave rise to the research in readability and contributed to its growth. The first factor was the new emphasis on quantification in developing a scientific basis for curriculum. The second factor was the experience-centered orientation in education. The third, and probably the most important, factor was the growing recognition of the need for individualizing instruction made more evident by the enforcement of compulsory school attendance laws.

Chall also states that the search for objective means of predicting readability, or reading difficulty, was prompted by three major purposes: first, to discover the factors which validly distinguish easy from hard material; second, to find a reliable means of measuring these factors; third, to formulate an expression of some combination of these factors in terms of the reading skill required to read and understand the material.[17]

Betts list a number of problems regarding the need for readability:

1. The trend to emphasize reading as the chief aid to learning appears to be on the increase.
2. A better professional understanding of the relationship between the readability of instructional materials and frustrations in reading situations.

3. Interest in problems of readability has been heightened by reports on discrepancies between grade scores achieved on standardized tests and the ability to read instructional materials.

4. Discrepancies between readability of books with the same grade level designations.

5. The trend to reduce the vocabulary load of basal textbooks.

6. The slow extension of practices in the direction of the experience approach.

7. Commercial value--textbooks, trade books, magazines, and newspapers.[18]

Hildreth reports the most pressing need for the classroom teacher.

> Fitting the books to the pupils presents a three fold problem; knowing the reading level of the books or other reading matter, ascertaining the reading achievement level of the pupils who are to use the books, and then bringing the two into alignment.[19]

Uses of readability formulas. Whether readability formulas can be used to predict more or less success in all printed communications is not known.[20]

Klare states that:

> By far the greater number of studies has been in the vaious subdivisions of the education field. Similarly, the earlier studies are found here. Applications in the general area of education have been as widespread as they have been numerous. The specific fields of application are: 1) elementary education, 2) secondary education, 3) collegiate education, and 4)adult education. The other fields in which readability studies have been made are: 1) Business and Industry, 2) Journalism and Mass Communications, 3) Legal and Governmental Writing, 4) Psychological Tests and Questionnaires, 5) Writing, 6) Speech, and 7) Foreign Languages.[21]

Arnsdorf reports that:

> Investigations of the readability of printed materials have led to the identification of numerous factors which may affect levels of difficulty. Results from studies in reading and social studies have contributed to the improvement and aided in the selection, of resources. However, while findings from research in this critical problem area have enabled teachers to make more judicious choices of materials, information related to the progression of levels of difficulty within a text and between the volumes of a series is limited.[22]

Chall reported that readability studies have been used as follows:

> To predict and control an individual's success with a particular book.
>
> Readability checks have been used in determining the difficulty of textbooks and supplementary materials in many areas of education such as textbooks, in reading, social studies, science, mathematics, encyclopedias, standardized tests and questionnaires.
>
> Used as a research tool for ascertaining the suitability of representative materials for intended audiences.
>
> Even newspapers have been subject to readability surveys. The formula most commonly used in journalism and industry is that of Flesch.
>
> Government agencis and health and welfare organizations have found their materials too difficult for the average reader through the use of readability studies.
>
> Public-poll questions and materials for the average adult have used readability to locate materials suitable in difficulty for adults of limited and average reading ability.[23]

Spache states the following uses of readability formulas:

> Readability formulas are needed when finer discriminations of the probable reading difficulty are sought, as in providing reading materials for young

children and for poor readers particularly. Teachers need and want materials which apparently differ by small degrees of difficulty when dealing with pupils of lesser reading skill.

When books have not been evaluated by expert opinion or other methods, as in the case of new trade books, or when a variety of book lists is not available to the teacher, then readability formulas are of immediate, practical service. When the teacher is doubtful about the accuracy of the publisher's grade level designations, or the texts see inappropriate for her pupils, formulas provide a quick basis for reevaluation. [24]

In summary, Smith reports that readability formulas may be thought of as tools of prediction of the success that certain groups will have in comprehending printed materials. The tools are rough and do not pretend to give absolute measures. They do not pretend to include all the factors which affect readability. However, these formulas are the best tools discovered as yet; and research workers, in applying them, have found them to give a fair estimate of prediction of success in reading. [25]

Limitations of readability formulas. Formulas have been criticized over the years due to the mistaken assumption that they were designed to measure all the important aspects of writing.

Klare listed the following limitations of reading formulas:

1. Formulas measure only one aspect of writing--style. Formulas do not touch on organization, word order, format, or imagery in writing; they do not take into account the differing purposes, maturity, and intelligence of readers.

2. Formulas measure only one aspect of style--difficulty. Other aspects of style are important, as any literary critic can point out.

3. Formulas do not even measure difficulty perfectly. Formulas appear to give scores accurate to, or even within, one grade-level. Yet, actually they are seldom this accurate. Also a formula score may be inaccurate due to errors in sampling or in application.

4. Formulas are not measures of good style.[26]

Studies made by twelve different authors as reported by Betts show that readability is influenced by the following:

1. Average sentence length in number of words.

2. The number of prepositional phrases.

3. Number of simple sentences.

4. Percentage of different words in a selection.

5. Number of uncommon words in terms of Thorndike index numbers.

6. Number of words beginning with certain letters.

7. Number of words with two or more syllables.

8. Number of adjectives, adverbs, personal pronouns, and other words related to human relationships.[27]

According to Spache, readability formulas do not reflect conceptual difficulties caused by varied contextual meanings or words, idiomatic expressions or the ratio of abstract and concrete terms. Secondly, the formulas do not evaluate the organizational character of materials, the manner of presentation or the degree of explanation.

Nor, obviously, can the formula predict the reader's interest in the content.[28]

> Added to the points enumerated, Chall listed the following suggestions, which also were intended to put the application of readability measurement on a realistic plane.
>
> 1. Readability formulas should be critically used. Too often grade placement indexes are accepted as true measures of difficulty when they should be considered only as first approximations of difficulty.
>
> 2. Readability formulas as prescriptions for writing should be approached with extreme caution. The formulas were not devised as rules for writing. They consider only limited aspects of difficulty.
>
> 3. Validation studies are needed to show the differences in actual reading comprehension as a result of changes effected by typical readability campaigns in journalism and industry.
>
> 4. Validation studies on textbooks are needed to throw light on the degree of confidence that can be placed in the various grade-level indexes of the various formulas and the extent of agreement among them.[29]

Within the limitations of studies on readability, use of the appropriate readability formulas can often be of unique value to those writing or selecting books for children or adults.

Surveys and experimental studies. In 1963, Arnsdorf made a study on the readability of basal social studies materials, between the books of a series for the elementary school. In the analysis two reading formulae were used, the

Spache Readability Formula for Primary Grade Materials and the Dale-Chall Formula for Predictining Readability. Each formula is based upon two counts--the percentage of unfamiliar words and average sentence length. However, the formulae differ in the relative weights assigned to sentence length and "hard-words" scores. Arnsdorf conclusions were that the readability level of the social studies series, determined by the application of a formula, generally progresses according to the publisher's recommended sequence, marked by irregularities. He also noted that the differences between the reading levels of primary and intermediate grade texts are large. What portion of this separation may be accounted for by the application of two different formulae is not known.[30]

A more recent study by Arnsdorf, in 1967, was concerning children's understanding of social studies concepts. Twelve intermediate (Grades 4,5, and 6) classrooms were selected to participate. Socio-economic backgrounds served by the schools were dominantly middle and upper-middle levels. The Gates Reading Survey vocabulary and comprehension sections were administered to obtain a measure of each pupil's reading capacity. To study the children's ability to comprehend basal social studies textbooks, two selections were used. Each selection was prepared in two forms. One was a verbatim reproduction of the textbook copy. The second

form was rewritten replacing indefinite expressions with more specific terms. Tests were given after studying the two forms. The results were that the average test scores on both selections indicated a gradual increase in understanding from grade to grade. However, in five of the six comparisons made children reading the adjusted materials with a more specific vocabulary scored higher than the children reading the basal textbook selection. Student performances at each level and on each selection seemed inadequate to meet the demands encountered in the independent reading activities of social studies program.[31]

In another concept study, Serra found that there is a scarcity of research dealing directly with the concept burden of instructional materials. From this study the following conclusions can be inferred:

1. The concept burden of social studies materials is excessive.

2. Difficult or unusual concepts are not repeated sufficiently often in social studies textbooks.

3. The problem of concept development is complicated by the vocabulary burden through the too frequent use of indefinite terms.

4. Verbalism can be avoided only by associating words with concepts that have their roots in experience.

5. There is a tendency today to reduce the concept load of instructional materials, particularly of the basal reading series.[32]

Smith made a study to secure some evaluation of reading difficulty of history and geography textbooks, workbooks, and current events papers for the fourth grade. The Dale, Lorge, and Yoakam formulas were used. Dale used two variables-average sentence length and vocabulary. Lorge used three variable on which to base his prediction-average sentence length, number of prepositional phrases and vocabulary. Yoakam bases his prediction on vocabulary alone. This study revealed that books and materials published for fourth grade have a readability average of almost fifth grade.[33]

To find the relationship of reading ability, as measured by teacher marks, to a wide range of learnings in the elementary school, a study was made by Hinkleman. The final reading grades for the 2A, 5A, and 7A semesters at the William G. Beale School in Chicago, Illinois were correlated by means of the rank order correlation method with teacher marks. The data of this study indicated progress in seven of the nine areas studied are markedly related to reading for the three selected grades. Hinkelman offers several explanations for the high relationship to reading. First, in most of the areas of learning, reading ability plays an important part in the activities of those subjects. Secondly, success in most schools depends on verbal type abilities such as found in reading. Last the

correlation in penmanship may result from the tendency of teachers to judge written reading activities in part on the quality of the handwriting.[34]

According to Staiger's survey the following ten factors probably influence the readability of primary reading textbooks:

1. Syllabic length of words.
2. Words typically introduced in first readers.
3. Words typically introduced in second readers.
4. Running words on the Dale List of 769 Easy Words.
5. Monsyllabic Words.
6. Different words on the Dale List of 769 Easy Words.
7. Different words on the Thorndike List of the 500 Commonest Words.
8. Words typically introduced in third readers.
9. Different words among the Thorndike 1000 Commonest words.
10. Words per paragraph.[35]

The last experimental study is one done by Wood. This research had several purposes: to measure some ordinary and typical classroom texts according to more than one reading formula and to see how they rank in difficulty according to more than one reading formula.

Twelve intermediate grade textbooks were rated by two readability formulas to determine the grade placement,

Dale-Chall and Yoakam. Thirty-two classroom teachers who used these textbooks were questioned to determine their evaluations of the same books.

The two formulas tended to be in agreement on placement of the textbooks used, for the most part being within three-tenths of a grade apart on results.[36]

DESIGN OF THE STUDY

In this research study, three second grade social studies textbooks were evaluated to determine their readability levels. The titles are the following:

1. Hunnicutt, C. W., and Grambs, Jean D., We Have Friends, The L. W. Singer Company, Inc., 1963, 187pp.

2. Samford, Clarence; McCall, Edith; and Gue, Ruth, You and the Neighborhood, Benefic Press, 1965, 142pp.

3. Wann, Kenneth D.; Wann, Frances Crockett; and Sheehy, Emma D., Learning About Our Neighbors, Allyn and Bacon Inc., 1964, 190pp.

For more reliable results, two readability formulas were used. The two readability formulas used were Spache and Yoakam.

Spache and Yoakam Formulas

Spache Formula. A readability formula for evaluating primary level reading material was developed by George Spache in 1953. The factors of sentence length and proportion of hard words were selected as most indicative of reading difficulty in primary materials. The procedure is the following:

Select 100 word samples for analysis;

Determine average sentence length in words--x_1;

Count number of words outside the Clarence R. Stone's revision of the Dale List of 769 Easy Words--x_2;

Use the following formula:

Grade level = $.141x_1 + .086x_2 + .839$(constant)

The accuracy of this formula compares very favorably with that obtained from other readability formulas. The probable error of estimate in predicting the grade level of a book by this method is 3.3 months. However, Stone felt that the accuracy of Spache's formula could be increased by revising the Dale List of 769 Easy Words. The originally list compiled by Dale was a selection of two other word lists: the International Kindergarten Union List and the first one thousand words of the Thorndike Teacher's Word Book of 10,000 Words.[37] Stone proposed that 173 of the 769 words be deleted and replaced by a similar number taken from L. L. Krantz's, "The Authors Word List" and Stone's A Graded Vocabulary for Primary Reading. This revised list yields a lower rating than the original Dale list.[38] Therefore, the Stone's revision of the Dale List of 769 Easy Words is now being used by Spache.

Clymer made a thorough study of the reliability of the Spache formula in relation to the number and method of sampling the contents of a book. He concluded that sampling from the beginning or end of each chapter was least accurate. Clymer also states that" three samples would provide an estimate precise enough for most uses, while twelve or fifteen samples from a book would give a very careful eval-

uation. More than fifteen samples is unwarranted in achieving a more precise estimate." [39]

Through the use of Safier's "Table for Quick Computation of the Spache Readability Formula" the detailed multiplication operations required by Spache formula were not necessary. (Appendix B, Table IV)

Yoakam Formula. The Yoakam formula was developed by Gerald A. Yoakam while he was at the University of Pittsburgh in 1939. The only factor considered is the weight of the vocabulary used. "This formula uses the serial numbers of words occuring in the Thorndike's Teachers Word Book of 30,000 Words." [40]

The use of the Yoakam formula for Primary Grade Materials requires the following steps:

Select a book to measure for readability.

Determine the size and number of the samples.

Locate the samples in the book.

Scan the samples to locate all words with Thorndike serial numbers of 2 or above by using the T column.

Add the serial numbers of the words in each sample to secure the unit index number.

Average the page index numbers to ascertain book index number.

Look-up book index number in "Tentative Scale for Rating Books used in Primary Grades," to place the book in its approximate grade. [41]

An interpolation by Turner of Yoakam's "Tentative Scale for Rating Books used in Primary Grades" was used due to the fact that the Yoakam Reading Difficulty and the DuVall Conversion scales are designed for grades four and up.*

With both the Spache and the Yoakam readability formulas, the techniques of the one hundred word count differ. The Spache formula specifies that to begin the count of the words, start at the beginning of a sentence and end the count with the last word of the sentence containing the one hundredth word. While the Yoakam formulas does not count sentences, the one hundredth word sometimes came in the middle of the sentence.

Using the rules of the Spache Formula with particular emphasis on Clymer's study, a table of random numbers was consulted in determining which page was to be the first sample in the textbook. After this number had been determined, the other sample pages were found by adding to and subtracting from this random number. If this page number was unsuitable due to maps, illustrations, and end of the unit question, the following page was used. Using the worksheets found in Appendix A, Table II and III, a record was kept for both formulas.

Due to differences in lengths of the texts, the intervals of pages differ between textbooks.

---

*See Appendix B, Table VII.

1. The L. W. Singer Company, Inc., --every 12 pages.
2. Benefic Press--every 11 pages.
3. Allyn and Bacon Inc.--every 12 pages.

With the desire for twelve or fifteen samples of one hundred words length (which usually took three or four pages), the end of a sample and the start of another sample left only eight or nine pages in between. The number of samples from the three social studies textbooks were:

1. The L. W. Singer Company, Inc.--15 samples.
2. Benefic Press--12 samples.
3. Allyn and Bacon Inc.--15 samples.

The Spache and Yoakam formulas were applied to the samples and a grade level determined. For the formula raw scores see Appendix C, Tables VIII, IX, and X.

PRESENTATION AND ANALYSIS OF DATA

Three social studies textbooks of the second grade were evaluated to find the readability level of each one. The titles of the three books are the following:

1. We Have Friends, The L. W. Singer Company, Inc., 1963.
2. You and the Neighborhood, Benefic Press, 1965.
3. Learning About Our Neighbors, Allyn and Bacon Inc., 1964.

The Spache and Yoakam readability formulas were used in determining the readability levels of the three textbooks. The procedures used for these formulas are found on pp. 20-24.

All of the sample pages consisting of one hundred words were scored according to the formulas. The raw scores were recorded on worksheets designed by the authors of the formulas (Appendix A, Table II and III). After the raw scores were found, these were added together and divided by the number of samples to find the average raw score. With the Yoakam formula, the "Tentative Scale For Rating Books Used In Primary Grades" was used to place the book in its grade level equivalent (Appendix B, Table VI). A more accurate determination was then made using the Turner Conversion Table (Appendix B, Table VII). For the Spache formula, Safier's table "For Quick Computation of the Spache Readability Formula" was used (Appendix B,

Table IV). The readability level of each sample is found in Appendix C, Tables VIII, IX, and X.

Analysis of Data

See Table I on page 27. An analysis of the data revealed:

1. For the L. W. Singer Company textbook according to Spache was on grade level.
2. For the Benefic Press and Allyn and Bacon, Inc. textbooks yielded higher grade levels of readability than the grade for which they were intended.
3. The Yoakam formula rated the books higher then the Spache formula.
   a. For the Singer Company, Yoakam rated the book .3 months higher than Spache.
   b. For the Benefic Press, Yoakam scored the book .3 months higher than Spache.
   c. For Allyn and Bacon, Yoakam scored the book .8 months higher than Spache.
4. Even though certain portions of some materials may be readable it seems that other portions are beyond the appropriate grade levels.
5. The Spache formula rated the books lower than the Yoakam formula as stated above.
6. The two formulas did not show significant differences in readability levels.

Table I

FINAL GRADE EQUIVALENTS OF SOCIAL STUDIES TEXTBOOKS

TEXTBOOK	FINAL GRADE	
	Spache	Yoakam
We Have Friends L. W. Singer	2.1	2.4
You and the Neighborhood Benefic Press	2.8	3.1
Learning About Our Neighbors Allyn and Bacon Inc.	2.7	3.5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

The purpose of this study was to determine the readability level of three social studies textbooks now being used in the second grade. This study evaluates these levels only to the extent that readability measures based on "hard words" and sentence length are adequate measures of reading difficulty.

Investigations of the research that has been done on the Spache and Yoakam formulas, both of which were used to determine readability in this study, seem to indicate the following:

1. Word-lists based on familiarity of words rate uncommon spellings too highly.
2. Spache's formula does not define, exactly, how to handle compound words or words with 'en' endings.

Previous investigators of readability levels of social studies textbooks tend to indicate that at the primary level, at least, there would seem to be no significant difference between the actual readability levels and the grade levels of the textbooks analyzed. The analysis made by this investigator would tend to substantiate these findings.

CONCLUSIONS

The following conclusions are drawn on the basis of the data collected by this investigator:

1. The readability levels of the selected commercial texts, as determined by the formulas, would seem to be somewhat above the assigned grade level.
2. There appears to be considerable variation of readability level among the textbooks considered.
3. The variation within each textbook seems to indicate that some portions of the texts should be comprehended by most students, while other portions of the same text are written on a relatively difficult level.
4. While there would certainly appear to be a difference between the readability levels and the assigned levels of the texts, Spache does not seem to score them at any significantly higher level.
5. Yoakam appears to attach a significant difference between readability levels and assigned grade levels of two of the texts surveyed. One of the texts is scored by Yoakam 1.1 grades above the intended level and scores another 1.5 grades higher. As pointed out by Yoakam, validation of the Yoakam formula has not been done, and thus

the results obtained for this study may not be a true reflection of the readability levels of the texts.

A logical approach to the study of readability of a textbook would apparently suggest that the level should be rather easy in the first part of a text, and become progressively more difficult in later parts. An examination of the Tables found in Appendix C would tend to show that the easier reading material in the texts studied was not necessarily at the beginning of the books, and that the more difficult reading material was disbursed throughout the books.

Readability is one of the many factors to be considered in the selection of the proper textbooks for a particular class. Furthermore, it would appear that readability formulas have become sufficiently accurate for estimating the comparative readability of primary grade materials.

RECOMMENDATIONS FOR FURTHER STUDY

In view of the findings of this study, recommendations for further research should include:

1. More social studies textbook evaluations to validate conclusions.
2. Further research done to increase complexity of formulas to include factors of format and organ-

izational content, and expressional elements.

3. Research conducted upon the value of the use of names and places in determining the difficulty of reading materials.
4. The repetition of hard words and the use of technical terms to be evaluated.
5. Further research to revise word lists to include modern terminology.
6. Further research to increase the accuracy of readability formulas.
7. More comprehensive studies of the factors that make up readability.

FOOTNOTES

FOOTNOTES

1. Gove, P. B., (ed.), Webster's Third New International Dictionary of the English Language Unabridged, p. 1889.

2. Klare, G. R., The Measurement of Readability, p. 1.

3. Yoakam, G. A., Basal Reading Instruction, p. 329.

4. Spache, G. D., Good Reading For Poor Readers, p. 27.

5. Klare, op. cit., p. 3.

6. DuVall, C. R., "A Study of the Readability Level of Selected Free and Inexpensive Social Studies Materials," A Paper presented to Doctor Albert H. Shuster, Professor of Education, Ohio University, March, 1964, p. 5, (citing Social Studies for Children in a Democracy, p. 3, by John U. Michaelis, second edition, Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1956.)

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12. Klare, G. R., "The Role of Word Frequency in Readability," Elementary English, 45:14, January, 1968.

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26. Klare, op. cit., pp. 24-25.

27. Betts, op. cit., p. 448.

28. Spache, op. cit., pp. 34-35.

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33. Smith, op. cit., pp. 18-25.

34. Hinkelman, E. A., "Relationship of Reading Ability to Elementary School Achievement," Educational Administration and Supervision, 42:65-67, February, 1956.

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41. Ibid., p. 332.

42. Spache, G. D., Good Reading For Poor Readers, p. 149.

43. Yoakam, op. cit., p. 339.

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Appendix A

Worksheet Forms

Table II

A Worksheet for Spache

Readability Formula

Book:_____ Page No. _____

Author:_____ From: _____

Publisher:_____ Date:_____ To: _____

1. Number of words in sample . . . . . _____
2. Number of sentences . . . . . _____
3. Number of words not on Stone List. . . . . _____
4. Average sentence length . . . . . _____
5. Per cent of hard words . . . . . _____
6. Estimated grade placement . . . . . _____

Average grade placement of _____ samples _____

Table III

A Worksheet for Yoakam

Readability Formula

Book:_____ Page No. _____

Author:_____ From: _____

Publisher: _____ To: _____

Date: _____

Number of words in sample . . . . . _____

Page Index Number(Total Serial Numbers of all words in Thorndike with value of 2 or higher) . . . _____

Book Index Number (total page index numbers and divide by number of pages sampled) . . . . . _____

Grade Level Equivalent . . . . . _____

APPENDIX B

Conversion Tables

Table IV

Safier Quick Computation of the Spache Readability Formula

Percent of Hard Words	NUMBER of SENTENCES: 19-22	16-18	14-15	12-13	11	10	9	8	7	6	5
	Average Sentence Length: 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
0	1.5	1.7	1.8	2.0	2.1	2.2	2.4	2.5	2.7	2.8	3.0	3.1	3.2	3.4	3.5	3.7	3.8	3.9
1	1.6	1.8	1.9	2.1	2.2	2.3	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5	3.6	3.7	3.9	
2	1.7	1.9	2.0	2.1	2.3	2.4	2.6	2.7	2.8	3.0	3.1	3.3	3.4	3.5	3.7	3.8		
3	1.8	1.9	2.1	2.2	2.4	2.5	2.6	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9		
4	1.9	2.0	2.2	2.3	2.5	2.6	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.7	3.9			
5	2.0	2.1	2.3	2.4	2.5	2.7	2.8	3.0	3.1	3.2	3.4	3.5	3.7	3.8				
6	2.1	2.2	2.3	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5	3.6	3.8	3.9				
7	2.1	2.3	2.4	2.6	2.7	2.9	3.0	3.1	3.3	3.4	3.6	3.7	3.8					
8	2.2	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9					
9	2.3	2.5	2.6	2.7	2.9	3.0	3.2	3.3	3.4	3.6	3.7	3.9						
10	2.4	2.5	2.7	2.8	3.0	3.1	3.3	3.4	3.5	3.7	3.8							
11	2.5	2.6	2.8	2.9	3.1	3.2	3.3	3.5	3.6	3.8	3.9							
12	2.6	2.7	2.9	3.0	3.1	3.3	3.4	3.6	3.7	3.8								
13	2.7	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9								
14	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.7	3.9									
15	2.8	3.0	3.1	3.3	3.4	3.5	3.7	3.8										
16	2.9	3.0	3.2	3.3	3.5	3.6	3.8	3.9										
17	3.0	3.1	3.3	3.4	3.6	3.7	3.9											
18	3.1	3.2	3.4	3.5	3.7	3.8												
19	3.2	3.3	3.5	3.6	3.7	3.9												
20	3.3	3.4	3.5	3.7	3.8													
21	3.4	3.5	3.6	3.8	3.9													
22	3.4	3.6	3.7	3.9														
23	3.5	3.7	3.8															
24	3.6	3.7	3.9															
25	3.7	3.8																
26	3.8	3.9																
27	3.9																	

Table V

CONVERSION OF FREQUENCY NUMBERS TO SERIAL NUMBERS [43]

Frequency of Occurrences	Serial Number
161 - 200	2.0
131 - 160	2.5
116 - 130	3.0
91 - 115	3.5
58 - 90	4
57	5
56	6
50 - 55	7
28 - 54	8
18 - 27	9
16 - 17	10
14 - 15	11
12 - 13	12
11	13
10	14
8 - 9	15
7	16
6	17
5	18
4	19
0 - 3	20
Not occurring in Thorndike	20

Table VI

TENTATIVE SCALE FOR RATING BOOKS USED IN PRIMARY GRADES[44]

Book Index Number	Grade
0 - 14.9	2
15 - 34.9	3
35 - 49.9	4

TABLE VII

YOAKAM TENTATIVE SCALE FOR RATING BOOKS USED IN PRIMARY GRADES:CONVERSION TABLE*

Score	Grade
0-1.4	2.0
1.5-2.9	2.1
3.0-4.4	2.2
4.5-5.9	2.3
6.0-7.4	2.4
7.5-8.9	2.5
9.0-10.4	2.6
10.5-11.9	2.7
12.0-13.4	2.8
13.5-14.9	2.9
15.0-16.9	3.0
17.0-18.9	3.1
19.0-20.9	3.2
21.0-22.9	3.3
23.0-24.9	3.4
25.0-26.9	3.5
27.0-28.9	3.6
29.0-30.9	3.7
31.0-32.9	3.8
33.0-34.9	3.9
35.0-36.4	4.0
36.5-36.9	4.1
38.0-39.4	4.2
39.5-40.9	4.3
41.0-42.4	4.4
42.5-43.9	4.5
44.0-45.4	4.6
45.5-46.9	4.7
47.0-48.4	4.8
48.5-49.9	4.9
50.0 +	5+

*An interpolation of the Tentative Scale for Rating Books used in Primary Grades: Yoakam, G. A., Basal Reading Instruction, p.337, developed by Turner, John H.

APPENDIX C

Formula Raw Scores and Final Grade Equivalents of Selected Social Studies Textbooks

TABLE VIII

Raw Scores and Final Grade Equivalents

We Have Friends

Singer Co.

Sample	Formula	Raw Score
p. 8	S	2.7
	Y	2.5
p. 20	S	1.8
	Y	0
p. 32	S	2.0
	Y	0
p. 44	S	2.2
	Y	0
p. 56	S	2.5
	Y	10.5
p. 70	S	2.0
	Y	3
p. 81	S	2.1
	Y	0
p. 92	S	2.1
	Y	22
p. 104	S	1.9
	Y	5.5
p.116	S	2.4
	Y	11
p.128	S	2.2
	Y	4
p.141	S	2.3
	Y	0
p.154	S	1.6
	Y	7

TABLE VIII (Cont.)

Sample	Formula	Raw Score
p.164	S	1.8
	Y	20
p.176	S	2.0
	Y	30

S - Spache Readability Formula

Raw Score 31.6 Average Grade Placement 2.1

Y - Yoakam Readability Formula

Raw Score 115.5 Average 7.7 Grade Level 2.5

TABLE IX

Raw Scores and Final Grade Equivalents

You and the Neighborhood

Benefic Press

Sample	Formula	Raw Score
p. 10	S	2.5
	Y	0
p. 20	S	2.3
	Y	0
p. 30	S	2.3
	Y	23
p. 40	S	2.4
	Y	4
p. 52	S	2.5
	Y	9
p. 65	S	2.6
	Y	17
p. 80	S	2.7
	Y	18.5
p. 93	S	3.1
	Y	7.5
p.105	S	3.4
	Y	40
p.116	S	2.7
	Y	3
p.128	S	3.2
	Y	60

S - Spache Readability Formula

Raw Score 33.5 Average Grade Placement 2.8

Y - Yoakam Readability Formula

Raw Score 212 Average 17.66 Grade Level 3.1

TABLE X

Learning About Our Country

Allyn and Bacon, Inc.

Sample	Formula	Raw Score
p. 10	S	2.8
	Y	16
p. 22	S	2.6
	Y	13
p. 35	S	2.8
	Y	73.5
p. 47	S	2.3
	Y	30
p. 58	S	2.8
	Y	5
p. 71	S	2.0
	Y	35
p. 82	S	3.4
	Y	28.1
p. 94	S	2.5
	Y	37
p.106	S	3.3
	Y	33.5
p.118	S	2.9
	Y	38
p.130	S	2.5
	Y	17
p.142	S	2.6
	Y	3
p.156	S	3.2
	Y	67
p.168	S	2.6
	Y	24

TABLE X (Cont.)

Sample	Formula	Raw Score
p.180	S	2.4
	Y	2

S - Spache Readability Formula

Raw Score 40.7 Average Grade Placement 2.7

Y - Yoakam Readability Formula

Raw Score 422.1 Average 28.14 Grade Level 3.6

APPENDIX D

Summary Presentation of Readability Formulas

TABLE 1

SUMMARY PRESENTATION OF READABILITY FORMULAS

Author(s)	Bibliography Number	Publication Date	Range of Difficulty	Formula	Comment
1. Lively and Pressey	(55)	1923	Grade 2–College	Weighted median index number = median of Thorndike index numbers, with zero-value words counted twice.	This probably can be called most accurately the first true readability formula.
2. Vogel and Washburne	(74)	1928	Grades 3–9	$X_1 = .085x_2 + .101x_3 + .604x_4 - .411x_5 + 17.43.$ (X_1 = reading score; x_2 = number of different words in 1000; x_3 = total number of prepositions; x_4 = total number of words not on the Thorndike list of 10,000; x_5 = number of simple sentences in 75 sample sentences.)	The prototype of modern readability formulas.
3. Dolch	(26)	1928	Primer–Grade 4	More than one of the following measures should be used: (1) percentage of different words; (2) percentage of difficult words (using the Dolch Combined Word Study List); (3) degree of difficulty of words; (4) median frequency of difficult words; and (5) degree of difficulty for supplementary reading.	
4. Lewerenz	(49)	1929	Grade 2–College	Determine percentages of words beginning with "w," "h," "b," "i," and "e" (first three considered easy, last two hard); consult table for each, and average the values to get a grade-placement score.	
5. Lewerenz	(50, 52, 54)	1930, 1935, 1939	Presumably Grade 2–College	Any of the following (each yielding a separate grade-placement score) may be used: (1) vocabulary difficulty—ratio of Anglo-Saxon words to Greek and Roman words; (2) vocabulary diversity—ratio of words appearing in "Clark's first 500" to total of different words; (3) vocabulary interest—estimate of image bearing or sensory words; (4) polysyllabic word count; and (5) vocabulary mass.	First two factors referred to in 1930, the third factor included in 1935, and the fourth and fifth in 1939.
6. Johnson	(46)	1930	Primer–Grade 8	Percentage of polysyllables; use tabled norms for grade placement.	

TABLE 1 (cont.)

SUMMARY PRESENTATION OF READABILITY FORMULAS

Author(s)	Bibliography Number	Publication Date	Range of Difficulty	Formula	Comment
7. Patty and Painter	(63)	1931	Grades 4–12	Index Number = $\frac{T.W.V.}{T.W.S.(R.)}$ or $\frac{A.W.W.V.}{R.}$ ($T.W.V.$ = total weighted [Thorndike] values for words; $T.W.S.$ = total words in sample; $R.$ = range [number of different words]; $A.W.W.V.$ = average-word-weighted-value.)	
8. Ojemann	(62)	1934	Primarily Grade 8–College	Readability scale provided by use of 16 passages ranked in order of tested difficulty; relation of sentence and vocabulary factors, and three qualitative factors, to above criterion provides further scale.	
9. Dale and Tyler	(25)	1934	Primarily below Grade 8	$X_1 = -9.4x_2 - 0.4x_3 + 2.2x_4 + 114.4$ ($\pm$ 9.0). (X_1 = percentage of adults of third to fifth grade reading ability who can comprehend a passage; x_2 = number of difficult technical words; x_3 = number of different, hard, non-technical words; x_4 = number of indeterminate clauses.)	Interesting in that it is one of the first true formulas for adults, even though actually for low-ability readers.
10. McClusky	(60)	1934	Primarily above Grade 8	Three factors used independently: (1) number of letters per word, (2) number of words per sentence, and (3) number of various types of nouns used; compare materials on these bases.	
11. Gray and Leary	(41)	1935	Grade 2–College	$X_1 = -.01029x_2 + .009012x_5 - .02094x_6 - .03313x_7 - .01485x_8 + 3.774$. ($X_1$ = average comprehension score for adults of limited reading ability; x_2 = number of different hard words [not common to Dale List of 769 words]; x_5 = number of personal pronouns; x_6 = average number of words per sentence; x_7 = percentage of different words; x_8 = number of prepositional phrases.)	Because of the detailed analysis made, Gray and Leary's work has been a landmark in the study of readability.

TABLE XI (Cont.)

11A. Kessler	(47)	1941	Presumably Grade 2–College	Two factors used independently: (1) average sentence length in words, and (2) average number of different hard words per 100 words. The values obtained are compared to Gray and Leary's standards.	
12. Morriss and Halverson	(61)	1938	Presumably Adult Level	The larger the proportion of words in Classifications III and IV and the smaller the proportion in I, the harder a book is. Classification I = simplest word labels; Classification II = localisms; Classification III = concrete ideas; Classification IV = abstract ideas.	The only formula to analyze words in context.
13. Washburne and Morphett	(75)	1938	Grades 1–9	X_1 (grade placement) = $.00255x_2 + .0458x_3 - .0307x_4 + 1.294$. ($x_2$ = number of different words; x_3 = number of different uncommon words [not in Thorndike's first 1500]; x_4 = number of simple sentences in 75 sample sentences.)	One of the most used children's formulas.
13A. Bergman	(20)	1936	Presumably Grades 1–9	X_1 (grade placement) = $.00255x_2 + .0458x_3 - .0307x_4 + 1.084$.	This formula is an early version of the Washburne-Morphett, identical except for the final constant.
13B. Edgerton	(28)	1945	Presumably Children's Level	Two factors used independently: (1) number of different uncommon words, and (2) average sentence length.	This formula was considered to be mainly a short version of the Washburne-Morphett formula by its author, though it also depended on Gray and Leary's work.
14. Lorge	(56)	1939	Grades 3–12	X_1 (grade placement) = $.07x_2 + .1301x_3 + .1073x_4 + 1.6126$. ($x_2$ = average sentence length in words; x_3 = number of prepositional phrases per 100 words; x_4 = number of different hard words per 100 words not on Dale 769-word list.)	This is really the first of the modern efficient formulas.
14A. Lorge	(58)	1948	Grades 3–12	X_1 (grade placement) = $.06x_2 + .10x_3 + .10x_4 + 1.99$.	This version differs from the above (1939) version only in slightly changed numerical constants.

TABLE 1 (*cont.*)

SUMMARY PRESENTATION OF READABILITY FORMULAS

Author(s)	Bibliography Number	Publication Date	Range of Difficulty	Formula	Comment
15. Yoakam	(78)	1939	Grades 4 to High School	Vocabulary given Thorndike index numbers, with page indexes formed by adding word indexes; grade placement of book then based on average of page indexes.	An unusual formula in that only one factor—vocabulary—is used.
16. Flesch	(32)	1943	Grades 3–12	Grade placement = $.1338x_s + .0645x_m - .0659x_h + 4.2498$. ($x_s$ = average sentence length in words; x_m = number of affixes; x_h = number of personal references.)	The first Flesch formula, and the formula that attracted widespread popular interest to readability.
17. Flesch	(33)	1948	Grades 3–12	*R.E.* (Reading Ease) = $206.835 - .846wl - 1.015sl$. ($wl$ = number of syllables per 100 words; sl = average number of words per sentence.) *H.I.* (Human Interest) = $3.635pw + .314ps$. (pw = number of personal words per 100 words; ps = number of personal sentences per 100 sentences.)	
17A. Powers, Sumner, and Kearl	(65)	1958	Approximately Grades 3–8	$X_{c_{50}} = -2.2029 + .0778sl + .0455wl$. ($X_{c_{50}}$ = reading grade score of pupil who can answer correctly one-half the McCall-Crabbs test questions on a passage.)	Flesch's formula, as recently recalculated for greater accuracy.
18. Dale and Chall	(23, 24)	1948	Grades 3–12	$X_{c_{50}} = .1579x_1 + .0496x_2 + 3.6365$. ($X_{c_{50}}$ = reading grade score of pupil who can answer correctly one-half the McCall-Crabbs test questions on a passage; x_1 = percentage of words outside the Dale list of 3000 [Dale score]; x_2 = average sentence length in words.)	
18A. Powers, Sumner, and Kearl	(65)	1958	Approximately Grades 3–8	$X_{c_{50}} = 3.2672 + .0596x_2 + .1155x_1$.	The Dale-Chall formula, as recently recalculated for greater accuracy.
19. Dolch	(27)	1948	Grades 1–6	Three or four factors used independently: (1) "average sentence" length; (2) "long sentence" length (upper decile of sentence lengths); (3) percentage of words not in Dolch's list; (4) number of polysyllabic words. Compare the values with the standards given.	

TABLE XI (Cont.)

20. Wheeler and Wheeler	(77)	1948	Presumably Children's Level	Select 1000 words and obtain grade placements by using the Thorndike list; compare the number of words at each grade level (as percentages).	
21. Flesch	(34)	1950	Grades 3–12	R (readability) = 168.095 + .532dw − .811wl. (dw = percentage of definite words; wl = number of syllables per 100 words.)	This formula uses a measure of abstraction to get at readability; another formula—simply percentage of definite words—measures level of abstraction by reference to a table of levels.
21A. Gillie	(39)	1957	Presumably Grades 3–12	Abstraction level = 36 + (number of definite words) + (number of finite verbs) + (2 times number of nouns of abstraction).	A shortened version of Flesch's level of abstraction formula.
22. Farr, Jenkins, and Paterson	(30)	1951	Presumably Adult Level	New Reading Ease Index = 1.599$nosw$ − 1.015sl − 31.517. ($nosw$ = number of one syllable words per 100 words; sl = average sentence length.)	This is a simplification of the Flesch "Reading Ease" formula.
22A. Powers, Sumner, and Kearl	(65)	1958	Approximately Grades 3–8	$X_{c_{50}}$ = 8.4335 + .0923sl + .0648 (per cent of monosyllables).	The Farr-Jenkins-Paterson formula, as recently recalculated for greater accuracy.
23. Gunning	(43)	1952	Presumably Grades 6–12	Reading grade level = .4 (average sentence length + percentage of words of 3 or more syllables, or polysyllables).	
23A. Powers, Sumner, and Kearl	(65)	1958	Approximately Grades 3–8	$X_{c_{50}}$ = 3.0680 + .0877 (average sentence length) + .0984 (percentage of polysyllables).	The Gunning formula, as recently recalculated for greater accuracy.
24. McElroy	(42)	1953	Presumably Adult Level	Fog Count = Sum of ones (easy elements in sentence) and threes (polysyllables or hard ideas).	To get reading grade level, divide total count for all analyzed sentences by number of sentences; if the average is over 20, divide by 2; if under 20, subtract 2, then divide by 2.

TABLE 1 (*cont.*)

SUMMARY PRESENTATION OF READABILITY FORMULAS

Author(s)	Bibliography Number	Publication Date	Range of Difficulty	Formula	Comment
25. Forbes and Cottle	(38)	1953	Grade 5–College	Index of vocabulary difficulty = sum of Thorndike weights of words above most common 4000.	A table yields corresponding grade levels. Note also that this formula was designed for use with psychological tests and inventories.
26. Spache	(67)	1953	Grades 1–3	Grade level = $.141x_1 + .086x_2 + .839$. (x_1 = average sentence length; x_2 = number of words outside Dale list of 769 words.)	
26A. Stone	(70)	1957	Presumably Grades 1–3	Grade level = $.141x_1 + .086x_2 + .839$. (x_1 = average sentence length; x_2 = number of words outside a list composed of words from Dale List of 769, Krantz's "Authors Word List," and Stone's *A Graded Vocabulary for Primary Reading*.)	The revised list is said to yield lower ratings than the original Dale list, and therefore lower grade-level scores.
27. Wheeler and Smith	(76)	1954	Primer–Grade 4	Index number = 10 (average unit [sentence] length × percentage of polysyllables).	To get a grade-placement score, consult formula tables.
28. Flesch	(36)	1954	Presumably Adult Level	"r" count = sum of references of a realistic, specific, or concrete nature; "e" score = sum of references of an energetic, forceful, or vivid nature.	For both equations, consult formula tables for interpretation of values.
29. Tribe	(72)	1956	Grade 2–8	$C_{50} = .0719x_1 + .1043x_3 + 2.9347$. ($x_1$ = average sentence length; x_3 = number of different words not on Rinsland list, with basic list score determined by dividing by number of words and multiplying this by 100.)	The Dale-Chall tables are suggested as a basis for corrected grade levels.
30. Flesch	(37)	1958	Presumably Adult Level	Score ("formality" to "popularity") = sum of occurrences of a "formal" to "popular" nature.	A table is provided to interpret scores.
31. Bloomer	(21)	1959	Primer–Grade 6	Grade level predicted on the basis of two variables, number of words per modifier, and sound complexity of modifiers.	This formula was designed to measure level of abstraction as a function of modifier load.